

# An 800 GHz Broadband Planar Schottky Balanced Doubler

Goutam Chattopadhyay, Erich Schlecht, John Gill, Suzanne Martin,  
Frank Maiwald, Alain Maestrini, David Pukala, and Imran Mehdi

*California Institute of Technology, Jet Propulsion Laboratory  
MS 320-47 Caltech, Pasadena, CA 91125, USA.  
E-mail: goutam@caltech.edu, Phone: (626) 395 4246.*

A broadband planar Schottky balanced doubler at 800 GHz has been designed and built. The design utilizes two Schottky diodes in balanced configuration on a 12  $\mu\text{m}$  thick Gallium Arsenide (GaAs) substrate as supporting frame. To minimize dielectric loading of the waveguides and reduce RF losses in passive circuits, a new fabrication technology [1], [2] is used where the GaAs substrate under the transmission lines is removed during the back-side processing, leaving free standing metal lines suspended in air from GaAs frame. Metal beam-leads are used for DC and RF contacts with the waveguides, and they allow the doubler chip to be dropped inside the split waveguide block, making assembly procedure simple, fast, and robust. This broadband doubler (736 GHz to 848 GHz) achieved 10% efficiency at 765 GHz, giving 700  $\mu\text{W}$  of output power when pumped with about 6.5 mW of input power at room temperature. This represents the best performance from any doubler at these frequencies to date in literature.

The design, fabrication, assembly, and testing of this doubler will be described. The performance of this doubler both at room temperature and at cryogenic temperatures will be presented.

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## REFERENCES

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